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Who's Sharing What With Whom? How Canadian Businesses Used Electronic Networks to Share Information in 2001.

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Who's sharing what with whom? How Canadian businesses used electronic networks to share information in 2001

Survey of Electronic Commerce and Technology, 2001

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Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review. The views expressed in the articles are those of the authors and do not necessarily reflect the views of Statistics Canada.

The Science and Innovation Information Program

The purpose of this program is to develop **useful indicators of science and technology activity** in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed in five key entities:

- **Actors**: are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- **Activities**: include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages**: are the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, the source of ideas for innovation in industry.
- **Outcomes**: are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts**: are the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a limited picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology in which it invests over five billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report **Federal Scientific Activities, 1998 (Cat. No. 88-204)** first published socio-economic objectives indicators to show *what* the S&T money is spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 (**Science and Technology Activities and Impacts: A Framework for a Statistical Information System,** Cat. No. 88-522). The framework has given rise to **A Five-Year Strategic Plan for the Development of an Information System for Science and Technology** (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

Our working papers and research papers are available at no cost on the Statistics Canada Internet site at http://www.statcan.ca/cgi-bin/downpub/research.cgi?subject=193.

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Preface

Innovation and the adoption and dissemination of technologies and practices are vital to economic growth and development. It is through innovation that new products are introduced to the market, new production processes are developed and introduced, and organisational changes are made. Through the adoption of newer, more advanced, technologies and practices, industries can increase their production capabilities, improve their productivity, and expand their lines of new products and services.

This study is one in a series of studies that the Science, Innovation and Electronic Information Division (SIEID) has undertaken that have examined technological and organisational change in the Canadian economy. The Survey of Electronic Commerce and Technology, 2000 contained two questions on organisational and technological improvements. These two questions provided the first cross-economy data on this issue, covering both firms in the private sector and organisations in the public sector.

In 1993, the first survey of innovation and the adoption of advanced technologies in the Canadian manufacturing sector was carried out. It was followed in 1996 by a survey of innovation in the communications, financial services and technical business services industries. The Survey of Innovation, 1999 surveyed manufacturing and was the first innovation survey of selected natural resource industries.

Biotechnology surveys carried out in 1996, 1997 and 1999 have examined both the development of new biotechnology products and processes and the use and planned use of biotechnologies. The 1999 Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries is the first survey of the innovation and advanced technologies and practices in the construction sector. A number of surveys have focused on the use and planned use of advanced technologies and practices: surveys of advanced manufacturing technologies were carried out in 1987, 1989, 1993 and 1998; and surveys of the use and planned use of information and communication technologies were carried out in 1999, 2000 and 2001.

In 2001, SIEID piloted the Knowledge Management Practices Survey that gathered information on the use and planned use of a series of business management practices as well as the reasons for implementing these practices and their perceived results. Interest in business practices continued with the addition of a question on how private sector enterprises and public sector organisations use electronic networks to share business information within their organisations and with other organisations to the 2001 Survey of Electronic Commerce and Technology. This working paper will examine with whom organisations are sharing selected types of business information.

Acknowledgements

This report provides new Statistics Canada estimates of the use of electronic networks to share business information electronically. The results are based on information from the Survey of Electronic Commerce and Technology, 2001. Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

The publication of this report was made possible by the contribution of many people including Bryan van Tol, Marie-Claude Duval and Sébastien Landry as well as Claire Racine-Lebel, Adele St Pierre, Craig Kuntz and Fred Gault.

Highlights

Networked businesses, those enterprises that had electronic networks in operation in 2001 represented 72% of business enterprises in Canada.

Networked businesses showed hesitation to use networks as a means to share selected types of information. Overall, networked businesses shunned sharing demand projections either within their organisations (4%) or with external organisations (3%).

Network facilitated training occurred rarely, and almost entirely within the organisation (10%) although a small percentage (4%) did provide training over electronic networks to other organisations.

Posting job opportunities did not have a high rate of occurrence although these postings were made available both internally (7%) and to external organisations (8%) at about the same rate.

Sharing order status information was more likely to occur with external organisations (13%) than within the organisation (7%).

Almost one-tenth of networked businesses shared inventory data within their organisations with one-twentieth sharing this information with other organisations.

Information sharing or gathering facilitated by electronic networks may have been viewed by networked businesses as more useful to garner and fill orders than to attract or develop staff. Almost one-third of networked businesses made product description catalogues available to external organisations including customers, suppliers and other organisations in 2001. However, just 15% of networked businesses shared their electronic catalogues internally.

Networked businesses also showed a higher level of interest in sharing or gathering customer information externally (19%) than internally (15%) in 2001.

Overall, the public sector by far outstripped the networked private sector in the usage of electronic networks to share information both internally and externally in 2001. The public sector showed a marked orientation towards using electronic networks to facilitate job mobility (55% posted job opportunities internally and 50% externally) and training (38% internally and 16% externally) that was not echoed by the networked private sector.

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Who's sharing what with whom? How Canadian businesses used electronic networks to share information in 2001.

Introduction

Businesses and individuals are using electronic networks more frequently today to obtain information, but are they also using them to share information or to create business solutions? Individuals can turn to the Internet to check out companies that post annual reports, catalogues and job opportunities. Businesses can post their catalogues, ask for and reply to tenders, offer training, communicate with customers and suppliers, and post job opportunities over electronic networks. Finally, public sector administrations have entered heavily into electronic information sharing under such initiatives as government on-line.

Recent studies have shown that only a small proportion of enterprises are embracing more advanced e-business applications such as selling (7%) and buying (22%) on-line while Internet adoption by Canadian firms is growing at a rapid pace. (Charles, Ivis and Leduc, 2002, pp. 3-5 and Peterson, 2001, pp 2-6.) According to Charles, Ivis and Leduc (2002, p.3) "E-business allows organisations to streamline production, reduce operational costs, expand markets, enhance collaborative business partnerships and strengthen customer and supplier relationships." Finally, electronic networks and how they assist organisations, private or public, to share knowledge has helped change how organisations manage and compete, locally, nationally and globally (de la Mothe and Link, 2002, pp. 4-5 and de la Mothe and Foray, 2001, pp. 218-222).

The Survey of Electronic Commerce captured how, in 2001, businesses used the Internet, intranets, Extranets or Electronic Data Interchange (EDI) to make information available within their organisations, to their suppliers, customers or accessible to other organisations. Businesses were asked the type of information or interactive or network-based activity that they made available on electronic networks.[1] Information included: product descriptions or catalogues; order status; demand projections; inventory data; customer information; and, job opportunities. The one interactive or network-based activity captured was electronic training. The information flows captured by this question provides a better understanding of how e-business, in particular electronic customer and supplier relationships are operating in Canada.

This paper briefly discusses for businesses with electronic networks what information is being shared, and with whom it is shared. While concentrating on the private sector some comparisons to the public sector are included. Firm size and major industrial sectors are highlighted. About 72% (A)[2] of businesses in Canada stated that they had

[1] The intent of the question was to "identify the type of information being transmitted over electronic networks and with whom the information is being shared." For the purposes of this paper, the direction of the information being shared in some categories such as job opportunities and product description catalogue could be understood as coming solely from the business. However, two-way sharing, or information (or an activity) coming both to and from the company could be understood for order status, demand projections, inventory data, customer information and training.

[2] Definition of the alphabetic quality indicator can be found in Appendix 1.

electronic networks in place (operation) in 2001. It is these businesses, known as "networked businesses" that form the basis of this study.[3]

Public sector organisations used electronic information sharing more than networked private sector enterprises

Overall, the public sector by far outstripped the networked private sector in the usage of electronic networks to share information both internally and externally. The gap between the networked private and public sector was narrowest in the low utilisation rate of electronic sharing of demand projections. This seeming lack of enthusiasm for sharing demand projections may be in part due to the sensitive nature of this strategic business information. Network security[4] issues might also play a role, as organisations might be concerned about competitors obtaining strategic information. It is for similar reasons that some companies do not make available printed or electronic copies of strategic plans, but rather present these plans on a need to know basis during closed meetings.[5]

The public sector showed a marked orientation towards using electronic networks to facilitate job mobility and training that was not echoed by the networked private sector. However, this may be due as much to how public sector administrations recruit and promote their employees as to differences in the employment size composition of the public and private sectors. Since the majority of organisations within the public sector are large, and often unionised, making job opportunities highly accessible and visible is an important component of human resources management. On the other hand, the majority of businesses within the private sector has less than 20 employees and therefore may not need to manage their recruitment and promotion programmes in quite such an administratively intensive manner.

Some of the question response categories may not have been as appropriate to aspects of the public sector as they are for the private sector. For instance, product description catalogues may not be made available easily by health care and social assistance agencies and they may not view the users of their services as customers.[6]

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[3] As almost every (99.7% A) public sector organisation indicated they had networks in place, the public sector is used when discussing public sector organisations with networks.

[4] Network security is an important issue facing all enterprises embarked upon e-business. The October 26, 2002 edition of *The Economist* contained a special supplement entitled "Securing the cloud: A survey of digital security." Internal (p.15) as well as external (pp. 11-15) security threats are discussed with emphasis placed on people being the weakest links in any networked security system.

[5] Fear of industrial espionage was given as a reason why one company was cautiously introducing some knowledge management practices during questionnaire testing for the Knowledge Management Practices Survey. The company had experienced a leak of a two-year strategic plan that had been made available only to company participants at an annual national meeting of executives.

[6] Just 16% (B) of public sector administrations in health care and social assistance indicated that they shared catalogues with customers. This rate is significantly lower than those for the public sector overall (34% B) or the other two main components of the public sector: educational services (61% B) and public administration (36% B).

Table 1. Proportion of networked private sector and networked public sector organisations engaged in sharing of electronic information by type of information, 2001

	Networked Private Sector*		Networked Private Sector with 1 or more full-time employees**		Networked Public Sector*	
	Internal Sharing %	External Sharing %	Internal Sharing %	External Sharing %	Internal Sharing %	External Sharing %
Product description or catalogue	15 B	32 B	16 B	33 B	35 B	40 B
Customer information	15 B	19 B	16 B	19 B	30 B	27 B
Training	10 B	4 B	11 B	4 B	38 B	16 B
Inventory data	9 B	5 B	9 B	5 B	17 B	6 B
Job opportunities	7 B	8 B	7 B	8 B	55 B	50 B
Order status	7 B	13 B	8 B	14 B	15 B	13 B
Demand projections	4 B	3 B	4 B	3 B	7 B	4 B
Definition of the alphabetic quality indicator can be found in Appendix 1. External is an aggregation of customers, suppliers and other organisations.						

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada

Notes: *Organisations that indicated they had electronic networks only.

**"Networked Private sector 1+ full-time employees" excludes some self-employed individuals as well as enterprises that employ only part-time employees but no full-time employees. This group is somewhat more comparable to the public sector as there are no 0 full-time employee public sector administrations.

Electronic sharing of information by networked businesses in its infancy

Similar to the results for buying or selling on-line, both more sophisticated e-business applications, networked business enterprises in Canada in 2001 showed hesitation to use networks as a means to share selected types of information. In fact, adoption rates fell with what could be considered the increasing sensitivity of the type of information being shared. Overall, networked businesses in the private sector with at least one employee shunned sharing demand projections either within their organisations or with any external organisation. Also, they proved hesitant to post job opportunities, provide training, inventory data or order status electronically (Table 1). As already stated, the public sector also did not participate in sharing demand projections and was only slightly more inclined towards sharing inventory data and order status over electronic networks.

Information sharing or gathering, facilitated by electronic networks, may have been viewed by networked businesses as more useful to garner and fill orders than to attract or develop staff. Almost one-third of networked businesses made product description catalogues available to external organisations including customers, suppliers and other organisations in 2001. However, just 15% of networked businesses shared their electronic catalogues internally. Networked businesses also showed a higher level of interest in sharing or gathering customer information externally (19%) than internally (15%) in 2001.

Electronic catalogue most popular form of sharing information by networked businesses

For networked enterprises with at least one employee, making product descriptions or catalogues available to customers by far proved to be the most popular electronic network information sharing activity. This activity was closely followed by having an electronic catalogue available within the organisation, sharing customer information within the organisation and in turn sharing (or collecting) customer information with (or from) the customer. Ensuring that suppliers had access to an electronic catalogue, making the catalogue available to other organisations and using networks for training followed (Table 2). Since sharing demand projections had such a high non-usage rate, it also had extremely low usage rates across the categories with internal to the organisation attaining just 4% (B). Offering electronic training outside the organisation also had negligible usage rates.

Table 2. Proportion of networked private sector enterprises with at least one full-time employee that used electronic networks to share information within their organisations or with suppliers or customers or other organisations, 2001

Networked businesses with 1 or more full-time employees	Sharing Information Electronically				Not Sharing Information Electronically %
	Within the Organisation %	With Customers %	With Suppliers %	Other Organisations %	
Product Description Catalogue	16 B	27 B	12 B	11 B	62 B
Customer Information	16 B	16 B	5 B	5 B	71 B
Training	11 B	1 B	1B	2 B	87 B
Order Status	8 B	7 B	10 B	1 B	82 B
Inventory Data	9 B	3 B	3 B	1 B	87 B
Job Opportunities	7 B	4 B	2 B	6 B	88 B
Demand Projections	4 B	2 B	1 B	1 B	94 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Some electronic product description catalogues make a more detailed level of information readily available to potential customers, such as catalogues used by online book vendors and large catalogue retailers. However, other electronic catalogues provide a high-level description with log-in facilities for more information including customer service. In this manner some information including prices, volume discounting mechanisms and other marketing and sales strategies can be kept between employees of the organisation and specific customers or clients. Also, for firms specialising in intangible services, generalised product descriptions of the services offered are often the only type of information that the firm might advertise online as in many cases the services offered are customised to the individual client and, as such, priced accordingly.

Of interest is the similarity of the level of sharing of order status information within organisations and with customers and suppliers. This suggests that these businesses could have been more heavily involved in "networking" - sharing information within

specific groups of enterprises to their mutual benefit. These networks, electronically facilitated, can be closed to non-network members and therefore enable members to enter into collaborative arrangements with other parts of the supply chain. For instance, a large retailer may have secure communication networks dealing with order status, or inventory data or demand projections with individual suppliers or groups of suppliers to ensure that their supplies are delivered on time. Suppliers may form a user group network to post their catalogues of products and/or inventory data to potential customers that log-in when they access the network. In the Survey of Electronic Commerce and Technology, 2001 sharing with external organisations did not differentiate between information shared online that is readily accessible by anyone or online information to whom access is restricted to secure network membership.

Higher adoption rate for sharing catalogues with customers in the goods producing sector

One third of the networked businesses with at least one employee in the goods producing sector[7] made their product description catalogues available to customers as opposed to just over one quarter of networked businesses in the services producing sector.[8] The services producing sector can be further subdivided into goods related services and intangible services. Networked businesses in the goods related services also led those in intangible services in sharing catalogue information with customers (31% B to 24% B). This suggests that tangible goods and their related services may be easier products for which companies can develop catalogues. However, as Table 3 below shows, information and cultural industries[9], part of the intangible services' sub-sector, appeared to have embraced sharing electronic product descriptions. This could be in part due to the nature of activity of these industries that includes disseminating and accessing of information regardless of medium.

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[7] The goods producing and services producing sectors were developed by aggregating North American Industry Classification System (NAICS) groups (Statistics Canada). The goods producing sector includes NAICS groups: 11 (see Methodology Annex for exclusions), 21-23 and 31-33. The services producing sector includes NAICS groups: 41, 44-45, 48-49, 51-56, 61-62 (excluding public sector enterprises), 71-72 and 81(excluding private households). Goods related services include NAICS groups: 41, 44-45 and 48-49. Intangible services include NAICS groups 51-56, 61-62 (excluding public sector enterprises) 71-72 and 81. Taken together goods related services and intangible services aggregate to the services producing sector.

[8] In the goods producing sector 77% A of businesses were networked enterprises in 2001 a similar proportion occurred in the services producing sector - 71% A; for goods related services it was 69% A; and intangible services 72% A.

[9] According to NAICS manual the Information and Cultural Industries sector "comprises establishments primarily engaged in creating and disseminating (except by wholesale and retail methods) information and cultural products, such as written works, musical works or recorded performances, recorded dramatic performances, software and information databases, or providing the means to disseminate them. Establishments that provide access to equipment and expertise to process information are also included. The unique characteristics of information and cultural products, and of the processes involved in their production and distribution, distinguish this sector from the goods-producing and services-producing sectors." "The main components of this sector are the publishing industries, including software publishing, the motion picture and sound recording industries, the broadcasting and telecommunications industries, and the information services and data processing industries." (Statistics Canada, 1998, p. 339) Due to the intangible as well as tangible nature of this industry it was classified as part of intangible services.

Networked wholesalers also appeared to be embracing sharing electronic catalogues with customers. In fact making product descriptions available to customers was far more important to networked wholesalers than sharing these catalogues within their enterprises. The lower rates of sharing electronic catalogues within organisations, than with customers, suggests that the networked businesses may be using electronic media, including the Internet, Extranets or EDI that were not readily accessible to all employees within the organisation. Therefore the electronic product descriptions may not be shared within the organisation.

Networked businesses with at least one employee in the goods producing and services producing sectors showed similar propensities (about one-tenth) towards sharing catalogues online with suppliers, with neither the goods related services nor intangible services sub-sectors deviating from this tendency.

Table 3. Networked businesses with at least one full-time employee sharing product description catalogues by sector and industrial sub-sectors, 2001

Networked businesses with 1 or more full-time employees	Sharing Product Description Catalogue				Not Sharing Product Description Catalogue %
	Within Organisation %	With Customers %	With Suppliers %	With Other Organisations %	
Private Sector (1+ employees)	***16 B***	***27 B***	***12 B***	***11 B***	*62 B*
Goods Producing Sector	**17 B**	**34 B**	**12 B**	**15 B**	**57 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	8 C	10 C	3 B	8 C	77 D
Mining & Oil & Gas Extraction	29 E	46 E	23 E	23 E	47 E
Utilities	16 D	36 E	14 D	19 D	56 E
Construction (excluding Trade Construction)	8 B	26 C	7 B	15 C	70 C
Manufacturing	24 B	43 B	16 B	16 B	47 B
Services Producing Sector	**16 B**	**26 B**	**11 B**	**10 B**	**63 B**
Goods Related Services	*20 B*	*31 B*	*13 B*	*8 B*	*56 B*
Wholesale Trade	30 B	46 C	19 B	13 B	44 C
Retail Trade	20 B	27 B	12 B	7 B	54 B
Transportation & Warehousing	4 B	15 C	5 B	4 B	81 C
Intangible Services	*14 B*	*24 B*	*11 B*	*10 B*	*66 B*
Information & Cultural Industries	41 D	56 D	30 D	30 D	37 D
Finance & Insurance	28 C	32 C	11 C	10 C	57 C
Real Estate & Rental & Leasing	13 C	32 C	6 B	10 B	64 C
Professional, Scientific & Technical Services	11 B	24 B	11 B	12 B	68 B
Management of Companies and Enterprises	21 D	19 D	9 C	9 C	75 D
Administrative & Support, Waste Management & Remediation Services	15 C	37 C	11 B	9 B	59 C
Educational Services (excluding public administration)	18 C	33 D	6 C	14 C	64 D
Health Care and Social Assistance (excluding public administration)	6 B	10 B	7 B	9 B	80 B
Arts, Entertainment and Recreation	12 C	33 D	7 B	13 C	64 D
Accommodation and Food Services	18 C	26 C	7 B	3 B	57 C
Other Services (excluding public administration)	16 B	16 B	17 B	10 B	67 C

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Smaller networked businesses were less likely to post electronic catalogues

Propensity towards using electronic product catalogues rose across employment size groups within both the networked private and public sectors. Perhaps due to cost, lack of in-house technical know-how or time constraints smaller networked organisations (1-99 full-time employees) showed a marked lower tendency towards using electronic networks to post catalogues. Similar findings are shown for public sector administrations suggesting that larger organisations are leading in more sophisticated applications of e-business such as customer relations.[10]

Table 4. Networked organisations by employment size group sharing product description catalogues, 2001

Networked Organisations	Product Description Catalogue			
	Within Organisation %	With Customers %	With Suppliers %	Other Organisations %
Total Private Sector	**15 B**	**26 B**	**11 B**	**10 B**
0 Full-time Employees[1]	6 B	14 B	6 B	3 B
1+ Full-time Employees	***16 B***	***27 B***	***12 B***	***11 B***
1-99 Full-time Employees	15 B	27 B	11 B	10 B
100-499 Full-time Employees	36 C	49 C	26 C	21 C
500+ Full-time Employees	46 D	53 D	21 C	19 C
Total Public Sector	**35 B**	**34 B**	**13 B**	**24 B**
1-99 Full-time Employees	14 C	19 C	7 B	17 C
100-499 Full-time Employees	31 B	32 B	9 B	20 B
500+ Full-time Employees	44 B	39 B	17 B	27 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: [1]The category 0 full-time employees represents a sub-set of the self-employed in Canada and should not be interpreted as representing all of the self-employed. Statistics Canada has implemented guidelines to protect small enterprises from response burden. Also, enterprises that employ part-time employees but not full-time employees would be counted as 0 full-time employees enterprises.

Sharing customer information electronically

Seven out of ten private sector networked enterprises with at least one employee did not share customer information and this proportion held true for the major sub-sectors: goods producing sector; services producing sector; goods related services and intangible services. Although customer information was not defined on the questionnaire, it could range from such basic items as names and addresses to detailed items including purchasing patterns and demographics. Of the industrial classes that showed higher inclinations towards sharing customer information, three were intangible services: information and cultural industries; finance and insurance; and, educational services.[11]

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[10] Ivis et al, highlighted these findings in their article as did Peterson. Larger administrations are also known to have higher propensity towards technological change (Earl, 2002, pp.11-12). Taken together these findings perhaps indicate that larger enterprises are better equipped to cope with the costs (time, resources and capital) of introducing e-business.

[11] Based on lower proportions of the networked businesses indicating that they did not share customer information (see Table 5).

Almost one-third of finance and insurance networked businesses and information and cultural industries shared customer information within their organisations. Since financial institutions offer a number of electronic banking services that allow customers to undertake financial transactions at non-home branch offices, as well as from their homes, this high rate for sharing customer information is not unexpected. Similarly, Internet service providers as well as publishers form part of the information and cultural services, the high rate of sharing customer information within their organisations again seems reasonable.

Private sector educational institutions emphasised sharing customer information with customers. This sharing of customer information most likely included making student grades available as well as some information on fees, payment schedules and receipts. Finance and insurance networked enterprises and information and cultural industries shared with private sector educational institutions this orientation towards sharing customer information with their customers. However, only information and cultural industries had a significantly higher rate of sharing customer information with customers than the intangible services sub-sector.

Manufacturing was the only industrial class in the goods producing sector to show a significantly higher inclination towards sharing customer information than the networked private sector with at least one employee[12]. Manufacturers' rates for sharing customer information within their organisations did not differ from the average for the networked goods producing sector, however this may be in part due to the composition of this sector as manufacturing comprised almost one half. Within the goods producing sector, manufacturing posted higher rates for internal customer information sharing than either mining, and oil and gas extraction or construction. However, in all of the external types of customer information sharing, manufacturing did not stray from the rates posted in the other goods producing industrial classes.

[12] While utilities recorded a lower proportion not sharing customer information than the private sector's average, this difference was not significant.

Table 5. Networked businesses with at least one full-time employee sharing customer information by sector and industrial class, 2001

Networked businesses with 1 or more full-time employees	Sharing Customer Information				Not Sharing Customer Information %
	Within Organisation %	With Customers %	With Suppliers %	With Other Organisations %	
Private Sector (1+ employees)	*16 B*	*16 B*	*5 B*	*5 B*	*71 B*
Goods Producing Sector	**17 B**	**16 B**	**5 B**	**3 B**	**71 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	16 D	15 D	...	...	71 D
Mining & Oil & Gas Extraction	7 B	24 E	1 B	1 B	70 E
Utilities	29 D	30 D	10 D	5 B	63 D
Construction (excluding Trade Construction)	9 C	13 C	6 B	6 B	81 C
Manufacturing	22 B	17 B	5 B	3 B	65 B
Services Producing Sector	**16 B**	**16 B**	**5 B**	**6 B**	**71 B**
Goods Related Services	*16 B*	*13 B*	*5 B*	*2 B*	*72 B*
Wholesale Trade	19 B	13 B	5 B	3 B	72 B
Retail Trade	16 B	15 B	3 B	1 B	70 B
Transportation & Warehousing	13 C	8 B	7 B	3 B	76 C
Intangible Services	*16 B*	*17 B*	*5 B*	*7 B*	*71 B*
Information & Cultural Industries	31 D	33 D	14 C	14 C	52 D
Finance & Insurance	31 C	28 C	11 C	6 B	57 C
Real Estate & Rental & Leasing	8 B	18 C	1 B	5 B	74 C
Professional, Scientific & Technical Services	17 B	18 B	5 B	6 B	68 B
Management of Companies and Enterprises	7 C	5 C	1 B	...	92 C
Administrative & Support, Waste Management & Remediation Services	17 C	16 C	4 B	5 B	72 C
Educational Services (excluding public administration)	15 C	30 D	3 B	10 C	55 D
Health Care and Social Assistance (excluding public administration)	9 B	6 B	3 B	8 B	80 B
Arts, Entertainment and Recreation	21 C	19 C	4 B	10 C	65 D
Accommodation and Food Services	13 C	15 C	2 B	3 B	75 C
Other Services (excluding public administration)	16 B	18 B	9 B	12 B	70 C
	... Number too small to be expressed				

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Small networked businesses were less likely to share customer information

Networked businesses with 1-99 employees (72% B not sharing) were less likely to share customer information than their larger counterparts - just 46 % (D) of networked businesses with more than 500 employees did not share customer information and it was 54% (C) for those with 100-499 employees. However, small networked businesses showed a much lower tendency towards sharing customer information within their organisations than their larger counterparts. Within the external customer information sharing rates a great similarity existed across the networked businesses employment size groups.

Table 6. Networked organisations by employment size group sharing customer information, 2001

Networked Organisations	Customer Information			
	Within Organisation %	With Customers %	With Suppliers %	Other Organisations %
Total Private Sector	**15 B**	**16 B**	**5 B**	**5 B**
0 Full-time Employees	5 B	13 B	2 B	2 B
1+ Full-time Employees	***16 B***	***16 B***	***5 B***	***5 B***
1-99 Full-time Employees	15 B	15 B	5 B	5 B
100-499 Full-time Employees	34 C	22 C	6 B	3 B
500+ Full-time Employees	38 D	31 D	6 B	7 B
Total Public Sector	**30 B**	**22 B**	**8 B**	**15 B**
1-99 Full-time Employees	15 C	9 B	6 B	12 C
100-499 Full-time Employees	26 B	22 B	4 B	14 B
500+ Full-time Employees	36 B	26 B	11 B	17 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada

The public sector and the private sector had surprisingly similar tendencies towards internal sharing of customer information across the employment size groups. Where the public sector differed from the private sector was in the much higher tendency of the public sector, across employment size groups, to share customer information with other organisations. This may be in part due to the administrative work done within most public sector organisations that requires them to work on behalf of clients with other public sector administrations. For instance, school children transferring from schools in one province to another may have their school records transferred electronically between administrations.

Order status flows and the intangible services sector

Intangible services may have experienced difficulties in responding to the question on order status information sharing, perhaps due to how the question was constructed. As already mentioned, health care and social assistance within the public sector had lower rates for sharing product description catalogues with customers. The public sector in fact had lower rates for sharing order status information externally across the three employment size groups than the corresponding size groups in the networked private sector, although on balance the overall rates for the public sector organisations and networked private sector enterprises were equal.

Of the industrial classes, mining and oil and gas extraction in the goods producing sector showed a strong resistance towards sharing order status information electronically either internally (3% B) or externally 2% B).

Most industries showed a greater tendency towards sharing order status information outside of their organisations. In fact, other than a few industrial classes in the services producing sector, networked businesses showed a remarkable tendency not to share order status information within their own organisations. Some industries including manufacturing, wholesale and retail trade and information and cultural industries appeared to have embraced sharing order status information. This electronic business solution may best suit their needs, as part of the intent of sharing order status information is to improve customer relationship management.

Table 7. Networked businesses with at least one full-time employees sharing order status information by sector, 2001

Networked businesses with 1 or more full-time employees	Sharing Order Status Information		Not Sharing Order Status Information
	Within the Organisation	With External Organisations	
	%	%	%
Private Sector (1+ employees)	*8 B*	*14 B*	*82 B*
Goods Producing Sector	**10 B**	**12 B**	**81 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	8 C	8 C	87 C
Mining & Oil & Gas Extraction	3 B	2 B	96 B
Utilities	4 B	15 D	82 D
Construction (excluding Trade Construction)	2 B	10 C	88 C
Manufacturing	15 B	15 B	74 B
Services Producing Sector	**7 B**	**14 B**	**82 B**
Goods Related Services	*13 B*	*22 B*	*71 B*
Wholesale Trade	19 B	21 B	62 C
Retail Trade	14 B	29 B	70 B
Transportation & Warehousing	4 B	12 B	87 B
Intangible Services	*5 B*	*11 B*	*86 B*
Information & Cultural Industries	20 C	19 C	68 D
Finance & Insurance	11 C	12 C	83 C
Real Estate & Rental & Leasing	3 B	8 B	90 B
Professional, Scientific & Technical Services	5 B	12 B	87 B
Management of Companies and Enterprises	7 C	7 C	87 D
Administrative & Support, Waste Management & Remediation Services	7 B	11 B	84 C
Educational Services (excluding public administration)	5 C	6 C	90 C
Health Care and Social Assistance (excluding public administration)	2 B	9 B	89 B
Arts, Entertainment and Recreation	...	8 C	91 C
Accommodation and Food Services	3 B	12 C	88 C
Other Services (excluding public administration)	6 B	13 B	83 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Larger enterprises were more likely to have adopted electronic sharing of order status information

Public sector organisations and larger networked enterprises again showed higher inclinations towards sharing order status information. About one in five networked enterprises with 500 or more employees made order status information available to their customers as opposed to less than one in ten networked enterprises with 1-99 employees.[13] However, interest in sharing order status information with suppliers averaged one in ten networked enterprises across the three employment size categories. Therefore, the enterprises sharing order status information with external organisations are more likely using this activity as part of their customer relations' business strategies.

[13] The actual rates for sharing order status information with customers by networked private sector enterprises are: 20% C - 500 or employees; 15% B - 100-499 employees; and 6% B - 1-99 employees.

Table 8. Networked organisations by employment size group sharing order status information, 2001

Networked Organisations	Sharing Order Status Information		Not Sharing Order Status Information
	Within the Organisation	With External Organisations	
	%	%	%
Total Private Sector	**7 B**	**13 B**	**82 B**
0 Full-time Employees	2 B	8 B	91 B
1+ Full-time Employees	*8 B*	*14 B*	*82 B*
1-99 Full-time Employees	7 B	13 B	82 B
100-499 Full-time Employees	24 C	25 C	61 C
500+ Full-time Employees	31 D	29 C	57 D
Total Public Sector	**15 B**	**13 B**	**77 B**
1-99 Full-time Employees	6 B	6 B	89 B
100-499 Full-time Employees	10 B	10 B	83 B
500+ Full-time Employees	21 B	17 B	71 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Sharing inventory data was not a popular activity

While just one out of ten networked businesses with at least one employee shared inventory data electronically, this activity, perhaps due to the nature of their operations was least popular with the intangibles services sub-sector. This lack of popularity of sharing inventory data by intangibles services could once again be due to the nature of their business with inventories playing a more minor role. In fact only one of the intangibles services, accommodation and food services attained the average for private sector with at least one employee in 2001. Accommodation and food services include traveller accommodation and food services and drinking places, networked enterprises in both of these industrial classes indicated that at least one out of ten of them electronically shared inventory data such as the availability of rooms, food supplies and their room rates through networks.

Within the services producing sector, goods related services most closely resembled the goods producing sector in their propensity to share inventory data within their networked businesses. However, transportation and warehousing networked businesses stand out for their almost complete lack of involvement in sharing inventory data.

Table 9. Networked businesses with at least one full-time employee sharing inventory data by industrial sector, 2001

Networked businesses with 1 or more full-time employees	Sharing Inventory Data		Not Sharing Inventory Data
	Within the Organisation	With External Organisations	
	%	%	%
Private Sector (1+ employees)	*9 B*	*5 B*	*87 B*
Goods Producing Sector	**13 B**	**5 B**	**85 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	6 C	3 B	91 C
Mining & Oil & Gas Extraction	7 B	2 B	92 B
Utilities	31 E	15 D	68 E
Construction (excluding Trade Construction)	9 B	6 B	88 C
Manufacturing	17 B	4 B	81 B
Services Producing Sector	**9 B**	**5 B**	**88 B**
Goods Related Services	*15 B*	*9 B*	*79 B*
Wholesale Trade	16 B	12 B	77 B
Retail Trade	20 B	10 B	74 B
Transportation & Warehousing	1 B	3 B	96 B
Intangible Services	*6 B*	*4 B*	*92 B*
Information & Cultural Industries	15 C	5 B	83 C
Finance & Insurance	6 B	3 B	92 C
Real Estate & Rental & Leasing	8 B	9 B	85 C
Professional, Scientific & Technical Services	4 B	2 B	94 B
Management of Companies and Enterprises	2 B	16 D	84 D
Administrative & Support, Waste Management & Remediation Services	6 B	4 B	90 B
Educational Services (excluding public administration)	1 B	...	99 B
Health Care and Social Assistance (excluding public administration)	2 B	...	98 B
Arts, Entertainment and Recreation	4 B	...	96 B
Accommodation and Food Services	10 B	4 B	88 B
Other Services (excluding public administration)	9 B	7 B	86 B
	... Number too small to be expressed		

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Larger networked organisations again were more likely to share inventory data electronically within their organisations

The public sector using electronic networks again outstripped the private sector in adopting networked inventory data sharing within their organisations with the largest administrations leading. However, when employment size groups are compared across the sectors, networked private sector enterprises pulled ahead of their public sector counterparts when they reached 100 employees.[14] As usual, small networked businesses lagged in their adoption rates of sharing inventory data within their organisations. As has already been mentioned this may be a function of their size, as these businesses may not need networked inventory data to operate efficiently.

[14] The adoption rates, due to data quality, are not significantly different between the private and public sector organisations with 500 or more employees.

Table 10. Networked organisations by employment size group sharing inventory data, 2001

Networked Organisations	Sharing Inventory		Not Sharing Inventory Data
	Within the Organisation	With External Organisations	
	%	%	%
Total Private Sector	**9 B**	**5 B**	**88 B**
0 Full-time Employees	4 B	5 B	94 B
1+ Full-time Employees	*9 B*	*5 B*	*87 B*
1-99 Full-time Employees	9 B	5 B	88 B
100-499 Full-time Employees	25 C	11 B	70 C
500+ Full-time Employees	29 D	13 C	66 D
Total Public Sector	**17 B**	**6 B**	**81 B**
1-99 Full-time Employees	16 C	...	83 C
100-499 Full-time Employees	13 B	3 B	85 B
500+ Full-time Employees	20 B	9 B	79 B
	... Number too small to be expressed.		

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Services producing sector slightly more likely to post job opportunities on external networks

Almost one-tenth of networked businesses in the services producing private sector posted job opportunities on Extranets or the Internet in 2001 as compared to just one-twentieth of their goods producing sector counterparts. Within the services producing sector, two intangible services, information and cultural industries (24% C) and educational services (29% D) led with real estate and rental and leasing (3% B) showing the least interest in using the Internet to attract external candidates for employment. The propensity to use networks to make job opportunities internally or externally rarely differed within each industrial class. Once again, large networked businesses showed higher propensities to post job opportunities both internally and externally than networked businesses with less than 100 full-time employees. As already mentioned, the large public sector administrations led by far in using networks to make job opportunities available both internally and externally.

Table 11. Networked businesses with at least one full-time employee posting job opportunities by industrial sector, 2001

Networked businesses with 1 or more full-time employees	Posting Job Opportunities		Not Posting Job Opportunities
	Within the Organisation	With External Organisations	
	%	%	%
Private Sector (1+ employees)	***7 B***	***8 B***	***88 B***
Goods Producing Sector	**8 B**	**5 B**	**89 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	13 C	4 B	87 C
Mining & Oil & Gas Extraction	12 D	17 D	80 D
Utilities	24 D	23 D	73 D
Construction (excluding Trade Construction)	4 B	2 B	95 B
Manufacturing	9 B	6 B	87 B
Services Producing Sector	**7 B**	**9 B**	**88 B**
Goods Related Services	*5 B*	*6 B*	*91 B*
Wholesale Trade	7 B	7 B	89 B
Retail Trade	4 B	6 B	91 B
Transportation & Warehousing	4 B	3 B	95 B
Intangible Services	*8 B*	*10 B*	*87 B*
Information & Cultural Industries	17 C	24C	71 C
Finance & Insurance	21 C	9 C	78 C
Peal Estate & Rental & Leasing	2 B	3 B	96 B
Professional, Scientific & Technical Services	8 B	12 B	85 B
Management of Companies and Enterprises	2 B	5 C	94 C
Administrative & Support, Waste Management & Remediation Services	9 B	10 B	87 B
Educational Services (excluding public administration)	12 C	29 D	70 D
Health Care and Social Assistance (excluding public administration)	2 B	8 B	91 B
Arts, Entertainment and Recreation	6 B	5 B	91 C
Accommodation and Food Services	11 C	7 B	86 C
Other Services (excluding public administration)	6 B	9 B	89 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Table 12. Networked organisations by employment size group posting job opportunities, 2001

Networked Organisations	Posting Job Opportunities		Not Posting Job Opportunities
	Within the Organisation	With External Organisations	
	%	%	%
Total Private Sector	***7 B***	***8 B***	***89 B***
0 Full-time Employees	3 B	2 B	96 B
1+ Full-time Employees	*7 B*	*8 B*	*88 B*
1-99 Full-time Employees	6 B	7 B	90 B
100-499 Full-time Employees	32 C	30 C	57 C
500+ Full-time Employees	56 D	40 D	38 D
Total Public Sector	***55 B***	***50 B***	***35 B***
1-99 Full-time Employees	44 D	22 C	48 D
100-499 Full-time Employees	44 B	42 B	46 B
500+ Full-time Employees	64 B	63 B	24 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Networked training was not at all popular in construction or transportation and warehousing

Perhaps due to the nature of their work, networked businesses in construction and transportation and warehousing were the least likely industrial classes to have adopted networked training. Both of these two industrial classes are known for their highly intense use of physical labour and both transportation and construction can have a high degree of work site mobility. These factors may have influenced the lower usage rates of internal networked training. Mining and oil and gas extraction businesses may also have had a lower adoption rate due in part to these factors. Some of the industrial classes in the intangible services, on the other hand, showed a higher tendency towards using networked training. Again their increased usage rates may reflect in part the nature of their operations. For instance, finance and insurance networked businesses that showed a significantly higher adoption rate of networked training might have found that this type of training facilitates the introduction of new financial packages or operational processes.

Table 13. Networked businesses with at least one full-time employee using networked training by sector

Networked businesses with 1 or more full-time employees	Network Training		Not Using Network Training
	Within the Organisation	With External Organisations	
	%	%	%
Private Sector (1+ employees)	*11 B*	*4 B*	*87 B*
Goods Producing Sector	**7 B**	**1 B**	**93 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	13 D	...	87 D
Mining & Oil & Gas Extraction	5 B	2 B	93 B
Utilities	16 D	3 B	83 D
Construction (excluding Trade Construction)	2 B	...	98 B
Manufacturing	8 B	2 B	91 B
Services Producing Sector	**11 B**	**5 B**	**87 B**
Goods Related Services	*9 B*	*3 B*	*90 B*
Wholesale Trade	9 B	3 B	90 B
Retail Trade	12 B	4 B	86 B
Transportation & Warehousing	3 B	1 B	97 B
Intangible Services	*12 B*	*5 B*	*85 B*
Information & Cultural Industries	20 C	12 C	75 C
Finance & Insurance	27 C	5 B	72 C
Real Estate & Rental & Leasing	8 B	4 B	91 B
Professional, Scientific & Technical Services	13 B	8 B	84 B
Management of Companies and Enterprises	9 C	...	91 C
Administrative & Support, Waste Management & Remediation Services	11 B	2 B	89 B
Educational Services (excluding public administration)	13 C	31 D	65 D
Health Care and Social Assistance (excluding public administration)	8 B	2 B	91 B
Arts, Entertainment and Recreation	7 B	...	93 B
Accommodation and Food Services	21 C	...	79 C
Other Services (excluding public administration)	8 B	6 B	88 B
	... Number too small to be expressed		

Source: Survey of Electronic Commerce and Technology, 2001, Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Public sector and larger networked businesses are switched onto internal networked training

Four out of ten public sector organisations used networks to offer training to their employees as opposed to one out of ten networked private sector businesses. The difference in the rates was driven by the low adoption rate of this form of training by small networked private sector businesses that are known to be less frequent trainers than their larger counterparts (Earl, 2002, p. 17). As table 14 below indicates, there was no difference in the training rates between the public and private sector networked organisations for mid-sized organisations, however, large public administrations led the economy in using networked training. Larger administrations with dedicated information technologists specialists may be able to better reap some of the benefits of web-based training such as responding to individual training needs and allowing flexibility. Smaller administrations, on the other hand, may not have available the skills to operate Web based training sites, let alone create or customise training packages.[15]

Table 14. Networked organisations by employment size group using networked training, 2001

Networked Organisations	Network Training		Not Using Network Training
	Within the Organisation	With External Organisations	
	%	%	%
Total Private Sector	**10 B**	**4 B**	**88 B**
0 Full-time Employees	4 B	3 B	94 B
1+ Full-time Employees	*11 B*	*4 B*	*87 B*
1-99 Full-time Employees	10 C	4 B	88 B
100-499 Full-time Employees	27 B	3 B	72 C
500+ Full-time Employees	36 B	8 B	63 D
Total Public Sector	**38 B**	**16 B**	**58 B**
1-99 Full-time Employees	15 C	10 B	82 C
100-499 Full-time Employees	25 B	9 B	71 B
500+ Full-time Employees	51 B	21 B	45 B

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Networked sharing of demand projections was almost a non-starter

Networked sharing of demand projections appears to have a restricted use, most likely due to the sensitivity of this type of information. Utilities led the usage of sharing demand projections within their enterprises, which may indicate the nature of this industrial class. Utility companies need to plan and closely monitor energy consumption and requirements based on forecasts that include upcoming weather conditions and anticipated industrial and consumer consumption rates. Extreme temperatures affect energy consumption, as does the construction of new housing developments, and industrial plants. Also, deregulation in the energy sector in particular natural gas, with electricity following, may be impacting the development of web-based business solutions

[15] See Matthew Friedman, "Keeping IT skills sharp" (pp.14-5. **Technology in Government**, January, 2003) and Monika Rola, "Benefits of online learning overhyped: Prof" (p. 15. **Technology in Government**, January, 2003).

that allow retail energy marketers to re-sell energy products. Customers need to be registered and under contract with the distributors. Some businesses have created networked systems to manage this multifaceted customer relationship.[16]

External sharing of demand projections very rarely occurred in any of the industrial classes, or employment size groups. However, this is not surprising as companies generally keep confidential strategic information and plans in order to maintain their competitiveness.

Table 15. Networked businesses with at least one full-time employee sharing demand projections data by industrial sector, 2001

Networked businesses with 1 or more full-time employees	Sharing Demand Projections		Not Sharing Demand Projections
	Within the Organisation	With External Organisations	
	%	%	%
Private Sector (1+ employees)	*4 B*	*3 B*	*94 B*
Goods Producing Sector	**8 B**	**5 B**	**90 B**
Forestry & Logging, & Support Activities for Agriculture & Forestry	5 C	...	95 C
Mining & Oil & Gas Extraction	3 B	...	96 B
Utilities	18 D	17 D	81 D
Construction (excluding Trade Construction)	7 B	4 B	92 B
Manufacturing	8 B	6 B	88 B
Services Producing Sector	**4 B**	**2 B**	**95 B**
Goods Related Services	*5 B*	*3 B*	*93 B*
Wholesale Trade	6 B	4 B	91 B
Retail Trade	6 B	3 B	92 B
Transportation & Warehousing	2 B	1 B	98 B
Intangible Services	*3 B*	*2 B*	*95 B*
Information & Cultural Industries	10 C	6 C	87 C
Finance & Insurance	8 C	5 B	89 C
Real Estate & Rental & Leasing	1 B	2 B	97 B
Professional, Scientific & Technical Services	4 B	2 B	95 B
Management of Companies and Enterprises	4 C	10 C	87 D
Administrative & Support, Waste Management & Remediation Services	4 B	2 B	94 B
Educational Services (excluding public administration)	3 B	...	97 B
Health Care and Social Assistance (excluding public administration)	1 B	1 B	98 B
Arts, Entertainment and Recreation	1 B	...	98 B
Accommodation and Food Services	3 B	...	97 B
Other Services (excluding public administration)	3 B	2 B	97 B
	... Number too small to be expressed		

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada Note: Rows will not add to 100% due to multiple responses to the questions.

Note: Rows will not add to 100% due to multiple responses to the questions.

[16] For more information see Gerry Blackwell's "The evolution of productivity: Using Web service to wring efficiencies out of existing systems" (**Ideas, Management Strategies for the Agile Business**, Issue 7, November 2002).

Table 16. Networked organisations by employment size group sharing demand projections, 2001

Networked Organisations	Sharing Demand Projections		Not Sharing Demand Projections
	Within the Organisation	With External Organisations	
	%	%	%
Total Private Sector	**4 B**	**3 B**	**94 B**
0 Full-time Employees	...	2 B	97 B
1+ Full-time Employees	4 B	3 B	94 B
1-99 Full-time Employees	4 B	3 B	94 B
100-499 Full-time Employees	12 B	4 B	86 B
500+ Full-time Employees	16 C	8 B	82 C
Total Public Sector	**7 B**	**4 B**	**91 B**
1-99 Full-time Employees	7 B	...	91 B
100-499 Full-time Employees	5 B	...	95 B
500+ Full-time Employees	8 B	5 B	88 B
	... Number too small to be expressed		

Source: Survey of Electronic Commerce and Technology, 2001; Statistics Canada
Note: Rows will not add to 100% due to multiple responses to the questions.

Summary

Electronic business solutions such as interactive networked training and sharing of customer and inventory information are very much in their early adoption stages by networked businesses in Canada. This suggests that the majority of Canadian businesses are not fully utilising networks to help them with their business performance.

It appears that while more commercial activities such as posting electronic catalogues or sharing (gathering) customer information have made in-roads, probably in support of ordering, buying and selling of products and services online (electronic or e-commerce), networked businesses, especially the smaller ones, are only slowly adopting more sophisticated "e-business" solutions. Indications are that networked businesses are interested in their customers, and are managing customer information while ensuring that they have a sales presence online. These businesses, however, show much reluctance to share more sensitive information such as inventory data, order status and demand projections even within their own organisations. This prompts a number of questions about the perceived need and effectiveness of sharing strategic business data and information over electronic networks. Businesses may not perceive that these e-business solutions are good value for money or have a low enough level of risk to encourage adoption. Networked businesses may not have an immediate need to adopt these solutions as their current business routines or management practices may be serving them well. Off-the-shelf e-business solutions such as networked inventory management packages or order tracking commercial software packages may not be available at effective costs for smaller businesses or with options or capabilities for customisation to the requirements of some industries. Finally, diffusion of new management practices and routines takes time and many of these e-business solutions have a degree of novelty that could require organisational cultural adaptation or changes to internal business values.

Interactive or network-based (web-based) training has infrastructure requirements that could be prohibitively expensive for networked businesses, especially smaller businesses. Training packages have to be developed or bought that allow multiple users in a network environment. It is possible, however to make these training packages available through a network for single-user purposes. Commercially available electronic training packages do not need to be networked and are often more conveniently stored on CD where they do not take up valuable memory and allow portability. It is also known that smaller businesses have a marked lower propensity to offer employees training. Larger enterprises that have more established reputations towards human resources development showed a higher inclination towards using networked training as well as using networks to make job openings available.

The public sector shared with larger enterprises human resources-oriented applications of e-business solutions. The influence of government online initiatives may be seen in the way that the public sector led in the adoption of most of the e-business solutions discussed. More sensitive strategic information such as sharing demand projections again saw limited usage in the public sector, although this may be in part due to the nature of business in the public sector.

Networked business information sharing within organisations and between organisations is slowly making inroads into how Canadian networked businesses operate.

Appendix 1 - Methodology

Methodology of the Survey of Electronic Commerce and Technology 2001 (SECT)

1. Introduction

The Survey of Electronic Commerce and Technology 2001 (SECT) is an annual survey existing for the third year. It collects information on communication and technology such as the use of computers, Internet and web sites, as well as the use of Internet to do electronic commerce from a sample of Canadian enterprises.

The collection began in November 2001 and data for the reference year 2001 was published in April 2002. The data are collected for the 12 month fiscal period for which the final day occurs on or between January 1, 2001, and December 31, 2001.

2. Coverage

The sample used for this survey covers most industrial sectors. These are described using the North American Industrial Classification System (NAICS). There are some sectors excluded such as:

A) **Sector 11 Sub-sector 111, 112 and 114** (Crop and Animal Production Industries, Fishing, Hunting and Trapping industries),
B) **Sector 23** Sub-sector 232 (Construction –Specialist contractors),
C) **Sector 91 Sub-sector 913** (Local Governments)
D) **Sector 55 Sub-sector 551114** (Head office),
E) **Sector 81 Sub-sector 814** (Private households).

3. Survey Frame and Target Universe

The frame consists primarily of the Business Register (**BR**) developed by Statistics Canada. The sampling unit is the enterprise. For more information on the Business Register and the sampling unit, refer to Cuthill (1998).

An administrative list is also used to cover some sectors such as the public sector, a part of the mining sector and the oil and gas sector. The Capital Expenditures Survey provides SECT with this list. These units are sampled with certainty.

Because of the dynamic nature of businesses and/or units missed by the frame used, some units may be added once the sample has been selected to obtain a better coverage for the desired reference year. These units are sampled with certainty.

The initial sampling frame contains around 1,650,000 enterprises.

Exclusions

Once the new universe is constructed, all units with income less than a certain limit are eliminated from the frame. We consider these units to have a negligible impact on electronic commerce. The exclusion allows us to reduce the response burden of small units.

The limit that delineates the out-of-scope units is determined as a function of industrial sector (NAICS), following the industrial level for publication. The limit is calculated in such a way that a maximum of 5% of the total revenue in the industrial sector becomes out-of-scope with a maximum exclusion threshold of $250,000.

After exclusion, the sampling frame contains around 630,000 enterprises. This frame is our target population.

4. Sampling

The sampling consists of stratification, allocation and sample selection that are described in the following text.

Stratification and Allocation

The sample was first stratified by NAICS at the level required for estimation. Then, within each industrial level, we built three strata by size: large units which are sampled with certainty, and medium and small units, in which the sampling is conducted using a probability of selection. The size variable is the Gross Business Income for the private enterprises and the Number of Employees for the public enterprises.

The method used is the Lavallée-Hidiroglou algorithm (1988) which does the stratification and the sample allocation to strata by minimizing the sampling size while attaining the target CV based on the size variable (see section 8 for more details on CVs).

A sample of around 21,000 enterprises allows us to obtain a target CV of 3.5% in the majority of industries except for the two new sectors covered by the survey (agriculture and construction) where a CV of 8% was targeted.

Once the stratification and the allocation were done, we increased the sample size in some strata when necessary in order to obtain a minimum sampling fraction of 1% and a minimum of five units by stratum when possible. The next step is to select the sample of enterprises.

Selection

All units were selected with certainty in the take-all strata while a random sample was selected in the take-some strata under the constraint of maximizing the overlap with the previous year's sample. The Kish and Scott method (1971) was used and allows an overlap of 63% with the last sample.

5. Collection and Data Editing

A questionnaire was mailed to enterprises and respondents were encouraged to complete and return it.

At data collection, some edits were applied to each questionnaire such as rules of consistency. For more details on the edit rules, see VanTol (2001).

Units that had not responded or had answered incorrectly were subject to mail, telephone and fax follow-up to ensure the data was obtained or corrected if needed.

Finally, we prioritized the follow-ups by taking into account the size of the enterprise, the importance of the missing variables, the kind of inconsistencies on the questionnaire and the coverage by industrial sector.

The definition of response rate varies depending on the needs. We will give here the response rate useful for data collection based on responding units among units where a questionnaire was sent.
Units sampled: 21,213 enterprises
Units sent out for data collection: 19, 299 enterprises
Responding units: 14,970 enterprises
Response rate for collection: 78%

Some units selected are not sent for data collection. These are units where their status changed since the frame was created and/or are errors on the frame such as duplicates, out-of-business or out-of-scope. There is no interest to send these units for collection.

6. Outlier Detection

Outlier detection was done on the variable "Sales over Internet". The detection was made within two groups: public sector and private sector. A method using the distance between observations was used (Nobrega, 1998).

Close to 20 units were detected as outliers. These units were analyzed and corrected if necessary. About 10 units were corrected. The units that are outliers and correct were promoted to a take-all stratum in order to represent only themselves. We consider that these units are missclassified during the sampling and do not correctly represent other units in the stratum. The selection probability for residual units was then recomputed.

7. Edit and Imputation

Once the survey collection was closed, some records remained incomplete and/or inconsistent. The missing and/or inconsistent fields on these records were imputed. Globally, around 10% of the fields were imputed due to missing data while 0.1% of the fields were imputed due to inconsistencies. Only partial questionnaires were imputed. In the case of total non-response, no imputation was performed. We simply reweighted responding units at estimation (see section 8: Estimation).

Many imputation methods were used: deterministic imputation, imputation using administrative data, historical imputation and donor imputation.

Deterministic imputation was used when answers from questions related to the question needing imputation lead to only one possible answer. 1.5% of the fields were imputed in this matter.

Imputation using administrative data was used to impute the question referring to the number of employees by using the number of employees available on the BR. Only 0.1% of the fields referring to the number of employees were imputed.

Historical imputation was used to impute some stable questions over time when the enterprise positively responded the year before. Only 45 fields were imputed under this method.

Donor imputation was finally used in the remaining cases to replace missing or incoherent values with those of the nearest respondent according to characteristics such as size, industrial classification and key variables from the questionnaire. We also checked to be sure that the imputed values did not affect the questionnaire's consistency. Imputation was conducted within homogeneous groups, the initial imputation group corresponding to the stratum. If there were not at least 10 potential donors and 25% of donors in a group, or if imputation from all available donors would result in questionnaire inconsistencies, we moved to a more aggregated imputation group in the following order:
NAICS-3 level and size grouping;
NAICS-3 level;
NAICS-2 level and size grouping;
NAICS-2 level.
Private/Public Sector.

Note that outlier enterprises were excluded from the donor pool. When imputation was done, we adjusted the sales value over the Internet by the ratio of imputed and donor's revenue. 8.7% of the fields were imputed by donors.

When we could not find any donor for an enterprise, it was manually imputed. This situation did not happen this year. Finally, when imputation was over, we reapplied the initial edit rules to assure the consistency of all the questionnaires going into the estimation process. Imputation flags were created to keep information about imputed fields.

8. Estimation

Statistics Canada's Generalized Estimation System (GES) was used (see 2001 GES). The estimation was done in two phases: the first phase sample was the initial sample and the second phase sample was the respondents. The same stratification was used at the first and the second phase by assuming no bias of non-response based on the results from the previous survey (Duval and Landry, 2000).

Three types of estimates were produced:

1) In the case of **percentage variables (*P*)**, a ratio was used to derive an estimate.

$$\hat{P}_d = \frac{\sum_s w_i z_i p_i(d)}{\sum_s w_i z_i} \text{ where } p_i(d) = \begin{cases} p_i \text{ if } i \delta d \\ 0 \text{ otherwise} \end{cases}$$

2) In the case of **categorical variables (*C*)**, again a ratio was used.

$$\hat{C}_d = \frac{\sum_s w_i z_i c_i(d)}{\sum_s w_i z_i} \text{ where } c_i(d) = \begin{cases} 1 \text{ if } i \delta d \text{ and the category was chosen} \\ 0 \text{ otherwise} \end{cases}$$

3) In the case of **numerical variables (Y)**, the usual estimator of the total was used.

$$\hat{Y}_d = \sum_s w_i y_i(d) \text{ where } y_i(d) = \begin{cases} y_i \text{ if } i \delta d \\ 0 \text{ otherwise} \end{cases}$$

The variable w_i represents the final weights of the unit i after reweighting to take into account the non-response. The variable z_i is the auxiliary variable that may be revenue, the number of employees or others depending on the variable being estimated. This variable, if used, allows us to produce economically weighted estimates which give more weight to large units.

For formulas for variance estimation of a two-phase design for each type of variable (*P*, *C* and *Y*), please refer to Arcaro (1998).

Calculation of CV

The coefficient of variation (CV) is computed using the ratio:

$$CV(\hat{Y}(d)) = \frac{\sqrt{\hat{V}(\hat{Y}(d))}}{\hat{Y}(d)}$$

where the numerator represents the estimate's standard deviation. Variable Y may represent any of the types of variables already discussed. However, in cases of percentage or categorical variables, we modified the CV calculation by using Y(d)=0.5. This way, we avoid getting very small or very large CVs due to Y(d) being close to 1 or close to 0.

This coefficient tries to give a relative measure of the error made when using a sample instead of using a census to derive an estimate about the whole population.

9. Confidentiality

Some confidentiality rules were used to suppress any information that might lead to disclosure of the data supplied by a respondent. These rules allow Statistics Canada to comply with its mandate of non-disclosure of information supplied by respondents. The rules themselves are confidential and are not available for consultation.

10. Sampling Error and Non-Sampling Error

The difference between an estimate based on sample data and the value obtained by surveying the entire population is called the sampling error. This difference varies with sample size, variability of the variable of interest, sampling design, and estimation method. In general, the larger a sample, the smaller its sampling error. If the population is very heterogeneous, a larger sample size is required to produce a reliable estimate.

The sampling error is measured by a quantity known as the standard deviation. The latter indicates the expected variability of the estimate that would be produced if we sampled repeatedly. The actual value of the standard deviation is unknown, but it can be estimated from the sample.

Another measure of precision is the coefficient of variation (CV). The CV is simply the standard deviation expressed as a percentage of the estimate. Hence it is a relative measure of precision and can be used for comparisons across industries or provinces. The smaller the CV, the more reliable the estimate.

As well as sampling error, they are non-sampling errors such as frame problems, response errors, data capture errors, etc. Although every effort is made to keep such errors to a minimum, they always exist. They are not taken into account in computing the CV. Measures such as response rate, coverage rate and imputation rate can be used as indicators of the possible extent of non-sampling errors.

Here are some results of the response rate among the 21,213 enterprises sampled:
Questionnaires completed: 32%
Questionnaires partially completed: 29%
No response before deadline: 22%
Unable to locate: 10%
Out-of-scope or out-of-business: 7%
Refusal: 0%

When the estimates are published, a scale distinguishes between the various qualities of accuracy. It combines the effect of sampling (using the CV) and the imputation rate (each imputed value adds to the uncertainty of the results). The scale is presented in Table 6.

Table 6
Quality indicator interpretation

	Imputation rate			
CV	0.00 - 0.10	0.10 - 0.33	0.33 - 0.60	0.60 - +++
0.00 - 0.05	A	B	C	F
0.05 - 0.10	B	C	D	F
0.10 - 0.15	C	D	E	F
0.15 - 0.25	D	E	F	F
0.25 - 0.50	E	F	F	F
0.50 - +++	F	F	F	F

A: Excellent B: Very good C: Good
D: Acceptable E: Use with caution F: Unpublishable

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